

## **40 CFR Part 61, Subpart R National Emissions Standards for Emission of Radon from Phosphogypsum Stacks**

### **Frequently Asked Questions**

#### **What is phosphogypsum?**

Phosphogypsum is a waste byproduct from processing phosphate rock using the "wet acid" method of fertilizer production. The phosphoric acid produced is a valuable component of fertilizer. The left over phosphogypsum has little or no economic or environmental value, and is simply piled up, or "stacked."

#### **Why does the EPA regulate phosphogypsum?**

Phosphogypsum contains radioactive material (radionuclides), which could potentially result in harmful exposure to radiation. Prior to processing, phosphate rock contains radium, uranium, thorium, polonium, and lead. Once the rock has been crushed and processed, the resulting waste has concentrated levels of these radioactive materials. Depending on the quality of the phosphate rock, the phosphogypsum could contain as much as 60 times the levels normally found prior to processing.

From a radiation protection perspective, EPA is concerned primarily with the radium, which tends to stay with the waste during processing. Radium-226 gives off radon-222, an odorless, colorless, and tasteless cancer causing radioactive gas. There is also a small amount of radiation being emitted from phosphogypsum in the form of gamma rays.

#### **How do EPA's regulations protect us from the radiation in phosphogypsum?**

EPA's regulations control the way in which phosphogypsum may be managed. It contains very specific operational requirements for owners and operators of stacks. Only two uses are permitted: limited agricultural use and research. Other uses may be proposed, but otherwise the phosphogypsum must be returned to mines or stored in stacks.

#### **How long has this rule been in effect?**

It was originally issued in December of 1989. This version of the rule was fairly strict, requiring phosphogypsum to be disposed of by returning it to the mine from which it was taken or by placing it in a stack. In 1992, EPA revised it to permit uses of phosphogypsum that fall into three categories: outdoor agricultural uses, for example as a conditioner for soils containing high quantities of salt or low quantities of calcium and other nutrients indoor research and development activities, for example to study the production of road-base and building materials using phosphogypsum other uses that are approved by EPA on a case-by-case basis.

#### **How does keeping it in stacks provide protection from the radiation? Don't the stacks give**

**off radiation?**

Storing the material in stacks takes advantage of the tendency of phosphogypsum to form a crust when it is exposed to weather. This limits the radiation that would otherwise be emitted. As the stacks are exposed to high humidity and rain, the crust that forms acts as a physical barrier against the radon. While the stacks do emit very low levels of gamma radiation, the levels are so low that they only present a significant risk when people are exposed continually over a long period of time.

**How big are these stacks?**

The best estimate puts the total amount kept in stacks at nearly 1 billion metric tons nationwide. The area covered by stacks in 1989 ranged from an average of 60 acres for inactive stacks to 224 acres for active stacks. The industry currently generates more than 30 million metric tons of phosphogypsum a year.

**Where are these stacks located?**

In 1989, there were 63 stacks in the U.S. Most of them are located in the southeastern states, where there are heavy deposits of phosphate rock. There are rich deposits found from North Carolina to Florida, and some small amounts in the Midwest. Most of the mining and processing is done in central Florida.

**Can't the phosphogypsum just be put back into the phosphate rock mines?**

A small fraction of the 40 million tons of phosphogypsum that are produced each year is used to refill the mines. However, the fertilizer manufacturers who own the phosphogypsum have found that it is more economical to just store it rather than to pay the cost of handling and transporting it back to the mines.

**What about the agricultural and research uses of the phosphogypsum?**

Phosphogypsum that has only very low concentrations of radionuclides may be used as a fertilizer and soil conditioner in agriculture. The amount that can be used this way is limited however, because only a small fraction of the phosphogypsum contains low enough radium concentrations to meet the conditions of the EPA requirements.

Limited research is underway to find other safe, beneficial uses for phosphogypsum. The fertilizer industry, universities and some states (most notably Florida) are conducting this research. Ideas that have been suggested are included under the Other Uses segment of this Web page.

**What if I have a idea for using the phosphogypsum and getting rid of the stacks?**

EPA has a process through which researchers, inventors, and entrepreneurs may propose other uses and apply for an exemption from the existing use and disposal requirements. You may apply for other use approval by following the specific steps listed in the regulation. The two key elements in any proposal for alternative use you submit are:

- a written description of your idea
- a risk analysis to demonstrate that neither the product nor the production process will

result in greater risks to the public or the environment than leaving the phosphogypsum in the stacks. EPA can provide explicit guidance on how to make this demonstration.

If you are interested, contact us.

### **How long will it take to get approval?**

Since each idea is different, the length of time EPA needs to review each proposal is different. You can expect the length of the review period to depend on the scope of the project, its level of complexity, and the quality of your application. If your application is simple, straightforward, and complete, we may be able to review and approve it in a matter of months. If it is complex, we will probably need more time and may need to consult with experts outside the Agency, which can extend the review period. We cannot finalize or review incomplete applications or applications that contain inaccurate or questionable data or analyses.

### **How can I track the progress of my application?**

We will assign a project officer to your application as soon as we receive it. This person will work with you and your application to ensure that it is processed as quickly as possible and will be able to keep you up to date on our progress.

### **Can I get a grant from EPA for research and development of my idea?**

These stacks are an increasing problem, and while EPA does not fund this work, there are several organizations that may provide funding and/or other assistance. These include:

- phosphate mining and
- processing companies
- state government or the municipal agencies responsible for managing phosphate operations (For example, Florida has created a group devoted to finding solutions to the problem and has funded their research and development.)
- local and national environmental groups.

If you can't figure out who to call, contact us and we'll see if we can help you.

### **How can I get more information?**

You may contact EPA about phosphogypsum in three ways:

- Contact your Regional EPA office
- E-mail us through ORIA Webmaster
- Write to us:

US Environmental  
Protection Agency  
401 M Street S.W.  
MS 6602J  
Washington, DC 20640